IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	)	Examiner: Quoc Dinh Hoang
	)	
Tue Nguyen; Tai Dung Nguyen	)	Art Group: 2818
	)	
Application No.: 09/898,439	)	Confirmation No.: 1885
	)	
Filed: July 5, 2001	)	
	)	
For: PLASMA SEMICONDUCTOR PROCESSING SYSTEM AND METHOD	)	

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 223 13-1450

SUPPLEMENT SUBMISSION AMENDING APPELLANT'S APPEAL BRIEF UNDER 37 C.F.R. § 41.37(a)

This is a SUPPLEMENTAL SUBMISSON in reply to the NOTIFICATION OF NON-COMPLIANT APPEAL BRIEF mailed September 7, 2007 and amending the APPELLANT'S APPEAL BRIEF filed August 10, 2007 appealing to the Board of Patent Appeals and Interferences from the decision of the Examiner dated December 18, 2006, which finally rejected claims in the above identified application.

Please substitute the following sections for corresponding sections previously submitted in the APPELLANT'S APPEAL BRIEF. **Please note that Section VII. ARGUMENT has been amended to retract a portion of the argument asserting that "coils" is modified by the adjective "spiral."** The modifying adjective is "spirally-connected" and not "spiral," therefore the retracted portion is inapplicable and should be stricken. Spirally-connected coils can include electrodes having shapes that are not spiral in overall form, such as a race-track shaped electrode, and should be given such scope in consideration of the appeal.

III. STATUS OF CLAIMS

Claims 1-29, 31-34, and 37 were previously canceled. Claims 30, 35, 36 and 38 are pending in the application and were finally rejected in an Office Action mailed December 18, 2006. Claims 30, 35, 36 and 38 are the subject of this appeal. A copy of claims 30, 35, 36 and 38 as they stand on appeal are set forth in the Claims Appendix.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Appellants' invention as claimed in claims 30, 35, 36 and 38 is directed to an improved electrode for coupling to an output of a RF generator or for use in an apparatus for semiconductor processing.

Following is a list of claims, with limitation of the claims including notations of exemplary figures with reference numerals and/or including citations from the Specification for guiding examination and interpretation of the claim. It should be noted that claim terms should be given their broadest possible interpretation and may encompass embodiments that vary from those noted below.

30. An improved apparatus for semiconductor processing **(see for example FIG. 1A, ref. 100)**, the improvement comprising a helical ribbon electrode, wherein the helical ribbon electrode comprises a compressed cylindrical helix having a plurality of flat concentric spiral coils **(see for example FIGS. 2B and 2C, ref. 172)** separated from each

other by a sheet of dielectric material **(see for example FIGS. 2B and 2C, ref. 174)**, each said flat concentric spiral coil comprising a ribbon-like form **(see for example Summary page 4, lines 3-12; Description page 10, lines 1-5)**, said ribbon-like form comprising a width and a thickness wherein the width is substantially greater than the thickness **(see for example page 11, lines 14-16; page 12, lines 11-24)**, the width lying in a plane that faces another of said plurality of flat concentric spiral coils **(see for example FIGS. 1D, 2B and 2C)**, and the thickness corresponding to a plane that is substantially parallel to a direction of stacking of said plurality of flat concentric spiral coils **(again see for example FIGS. 1D, 2B and 2C)**.

35. (Previously amended) An apparatus for semiconductor processing, the apparatus comprising:

a process chamber; **(see for example FIG. 1A, ref. 102)**

a solid state RF plasma generator coupled to the process chamber to excite a processing gas and generate a plasma; **(see for example FIG. 1A, ref. 112, 104, 116; Description page 9, lines 12-22)**

a controller coupled to the solid state RF plasma generator to pulse the solid state radio frequency plasma generator for each deposited layer; **(see for example FIG. 1A, ref. 130; Description page 10, lines 12-17)**and

a cylindrical helical ribbon electrode coupled to an output of the solid state radio frequency plasma generator, the cylindrical helical ribbon electrode further comprising:

a plurality of spirally-connected ribbon-shaped coils, each said coil having a width and a thickness; **(see for example Summary page 4, lines 3-12; Description page 10, lines 1-5)**

the width substantially greater than the thickness and flat in a dimension facing another of said plurality of spirally-connected ribbon-shaped coils; and **(see for example page 11, lines 14-16; page 12, lines 11-24)**

the thickness is substantially perpendicular to the width, **(see for example FIGS. 1D, 2B and 2C)**

wherein the distance between the cylindrical helical ribbon electrode and a sample situated in the process chamber is less than five inches, and **(see for example Description page 11, lines 12-16)**

wherein a sheet of dielectric material separates adjacent said spirally-connected ribbon-shaped coils so that, when compressed, the adjacent surfaces of the spirally-connected ribbon-shaped coils do not touch. **(see for example Description page 12, lines 5-9)**

36. (Previously presented) The apparatus of claim 35 wherein a width of the dielectric sheet is greater than the width of the spirally-connected ribbon-shaped coils. **(see for example Description page 13, lines 6-8)**

38. (Previously presented) An improved electrode for coupling to the output of a RF generator, the improvement comprising a helical ribbon electrode further comprising:

a plurality of substantially flat, concentric, spirally-connected coils, said coils having a width and a thickness, the width being in a dimension facing an adjacent coil, and the thickness being perpendicular to the width, where the width is substantially greater than the thickness; and **(see for example Summary page 4, lines 3-12; Description page 10, lines 1-5; age 11, lines 14-16; page 12, lines 11-24)**

a sheet of dielectric material between adjacent coils. **(see for example Description page 12, lines 5-9)**

VII. ARGUMENT

A. Independent claims 30 and 38 are patentable under 35 U.S.C. § 102(b) over Amagasa

Claims 30 and 38 stand or fall together. Claim 38 is the representative claim.

Claim 38 recites:

38. (Previously presented) An improved electrode for coupling to the output of a RF generator, the improvement comprising a helical ribbon electrode further comprising:

a plurality of substantially flat, concentric, spirally-connected coils, said coils having a width and a thickness, the width being in a dimension facing an adjacent coil, and the thickness being perpendicular to the width, where the width is substantially greater than the thickness; and

a sheet of dielectric material between adjacent coils.

The present invention claims a helical ribbon electrode, comprising a sheet of dielectric material to separate each coil. The present electrode is a conductor coupled to the output of a RF generator circuit and serves as an antenna to radiate energy from the RF generator.

In contrast, Amagasa does not disclose an electrode or a sheet of material to separate each coil of the electrode.

Amagasa discloses an inductive coil with certain value of capacitance to act as a low pass filter in an electrical circuit. The inductive coil serves as an inductance in a dynamo electric machine or for a protection circuit for AC to DC converter.

An electrode is a conductor, which is not necessarily an inductor, and which possesses different design characteristics for the purpose of efficiently radiate energy from an RF generator. The electrode is designed for a circuit using an open-loop current, converting a power into an electromagnetic field.

The characteristics of an inductive coil include essentially its inductance and parasitic capacitance, and are designed for a circuit using closed-loop current with no concern for electromagnetic radiation. Amagasa teaches an inductive coil having a high capacitance design between the coils for maximizing the low pass filter characteristics. Thus the inductive coil is not considered an electrode since it does not possess its desired characteristics.

Further, the present electrode and Amagasa's inductive coil are from different field of application. The coil of Amagasa serves as a low pass filter for a rectifier circuit, while the coil of the present invention serves as an electrode for an RF generator to radiate energy. Thus it is not obvious that an inductive coil designed for an IV characteristic circuit can be applied as an electrode with electromagnetic field radiation as the main characteristics.

Further, the present electrode comprises a sheet of dielectric between each turn of the spiral coils.

In contrast, in an embodiment, Amagasa discloses a resin or natural mica 54 between the coil turn (Fig. 4). In other embodiment, Amagasa discloses a metal foil wrapping around the coil turns (Fig. 6). Amagasa does not disclose a sheet of dielectric material separating the coil turns.

B. Claims 35 and 36 are patentable under 35 U.S.C. § 103(a) over Ye and Amagasa

Claims 35 and 36 stand or fall together. Claim 35 is the representative claim.

Claim 35 recites:

35. (Previously amended) An apparatus for semiconductor processing, the apparatus comprising:

a process chamber;

a solid state RF plasma generator coupled to the process chamber to excite a processing gas and generate a plasma;

a controller coupled to the solid state RF plasma generator to pulse the solid state radio frequency plasma generator for each deposited layer; and

a cylindrical helical ribbon electrode coupled to an output of the solid state radio frequency plasma generator, the cylindrical helical ribbon electrode further comprising:

a plurality of spirally-connected ribbon-shaped coils, each said coil having a width and a thickness;

the width substantially greater than the thickness and flat in a dimension facing another of said plurality of spirally-connected ribbon-shaped coils; and

the thickness is substantially perpendicular to the width,

wherein the distance between the cylindrical helical ribbon electrode and a sample situated in the process chamber is less than five inches, and

wherein a sheet of dielectric material separates adjacent said spirally-connected ribbon-shaped coils so that, when compressed, the adjacent surfaces of the spirally-connected ribbon-shaped coils do not touch.

Ye discloses an apparatus for semiconductor processing with the coil being an electrode coupled to an RF power, while Amagasa discloses a coil for a dynamo electric machine or for a protection circuit with the coil being a component in a low pass filter circuit.

Amagasa does not mention semiconductor processing, or mention an electrode for an RF generator. Ye does not mention dynamo or low pass filter for circuit protection. Thus Ye and Amagasa are not from the same field of endeavor.

Further, there is no connection between Ye's coil and Amagasa's coil. Ye discloses a plasma coil with a circular cross section, not a rectangular cross section, thus there is no width or thickness. Also Ye discloses a flat spiral coil while Amagasa discloses a helical spiral coil.

Further, the purpose of Amagasa would not be recognized in the pertinent art of Ye. The Examiner stated that the motivation for combining Amagasa to Ye would be found in the purpose of Amagasa to reduce the size while increase the capacitance of the coils.

However, the purpose of Amagasa is to increase the capacitance of the inductive coil for a low pass filter, but which is irrelevant in the art of Ye. Ye does not desire a size reduction or a capacitance increase for the coil electrode. The optimization of the electrode coupled to the output of a RF power generator is to maximize the power transfer and the desired plasma characteristics for semiconductor processing. Capacitance increase of the coil electrode does not play a role in the art of semiconductor processing optimization of Ye.

Thus, with regard to the combination of Amagasa to Ye, a person of ordinary skill in the art would not be prompted to look to art completely unrelated and seemingly providing no beneficial solutions to the problem at hand.

IX. CLAIMS APPENDIX

1.-29. (Canceled)

30. (Previously presented) An improved apparatus for semiconductor processing, the improvement comprising a helical ribbon electrode, wherein the helical ribbon electrode comprises a compressed cylindrical helix having a plurality of flat concentric spiral coils separated from each other by a sheet of dielectric material, each said flat concentric spiral coil comprising a ribbon-like form, said ribbon-like form comprising a width and a thickness wherein the width is substantially greater than the thickness, the width lying in a plane that faces another of said plurality of flat concentric spiral coils, and the thickness corresponding to a plane that is substantially parallel to a direction of stacking of said plurality of flat concentric spiral coils.

31.-34. (Canceled)

35. (Previously amended) An apparatus for semiconductor processing, the apparatus comprising:

a process chamber;

a solid state RF plasma generator coupled to the process chamber to excite a processing gas and generate a plasma;

a controller coupled to the solid state RF plasma generator to pulse the solid state radio frequency plasma generator for each deposited layer; and

a cylindrical helical ribbon electrode coupled to an output of the solid state radio frequency plasma generator, the cylindrical helical ribbon electrode further comprising:

a plurality of spirally-connected ribbon-shaped coils, each said coil having a width and a thickness;

the width substantially greater than the thickness and flat in a dimension facing another of said plurality of spirally-connected ribbon-shaped coils; and

the thickness is substantially perpendicular to the width,

wherein the distance between the cylindrical helical ribbon electrode and a sample situated in the process chamber is less than five inches, and

wherein a sheet of dielectric material separates adjacent said spirally-connected ribbon-shaped coils so that, when compressed, the adjacent surfaces of the spirally-connected ribbon-shaped coils do not touch.

36. (Previously presented) The apparatus of claim 35 wherein a width of the dielectric sheet is greater than the width of the spirally-connected ribbon-shaped coils.

37. (Canceled)

38. (Previously presented) An improved electrode for coupling to the output of a RF generator, the improvement comprising a helical ribbon electrode further comprising:

a plurality of substantially flat, concentric, spirally-connected coils, said coils having a width and a thickness, the width being in a dimension facing an adjacent coil, and the thickness being perpendicular to the width, where the width is substantially greater than the thickness; and

a sheet of dielectric material between adjacent coils.

CONCLUSION

For the reasons provided in the Appellant's Appeal Brief (as amended), Appellants respectfully submit:

A. Independent claims 30 and 38 are patentable under 35 U.S.C. § 102(b) over Amagasa, and

B. Claims 35 and 36 are patentable under 35 U.S.C. § 103(a) over Ye and Amagasa.

Appellants respectfully request that the Board reverse the rejections on claims 30 and 38 under 35 U.S.C. § 102(b) and the rejections on claims 35 and 36 under 35 U.S.C. § 103(a) and direct the Examiner to enter a Notice of Allowance for claims 30, 35, 36 and 38.

Respectfully Submitted,

/Sheldon R. Meyer/

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